ORIGINAL

ALFRED H KNIGHT

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CERTIFICATE OF ANALYSIS

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CERTIFICATE NUMBER	:	369180/1
DATE OF ISSUE	:	14th April 2020
MATERIAL DESCRIPTION	:	Colombian Steam Coal
VESSEL	:	**MV. ALGOMA VISION**
LOAD PORT	:	Puerto Drummond, Colombia
DATE LOADED	:	9th - 11th April 2020
B/L WEIGHT	:	61,801.47 MT

Report of Analysis

PARAMETER	UNIT	AS RECEIVED	AIR DRIED	DRY BASIS	DRY ASH-FREE	TEST METHOD
TOTAL MOISTURE	%	13.3	-	-	-	ASTM D3302
INHERENT MOISTURE	%	-	9.2	-	-	ASTM D3173
ASH CONTENT	%	7.4	7.7	8.5	-	ASTM D3174
VOLATILE MATTER	%	33.8	35.4	39.0	42.6	ASTM D3175
FIXED CARBON	%	45.5	47.7	52.5	57.4	ASTM D3172
TOTAL SULPHUR	%	0.73	0.76	0.84	0.92	ASTM D3177
CHLORINE	%	0.01	0.01	0.01	0.01	ASTM D2361
FLUORINE	ppm	42	44	49	53.55	ASTM D3761
CARBON	%	62.5	65.5	72.1	78.8	ASTM D3178
COAL HYDROGEN	%	4.27	4.47	4.92	5.38	ASTM D3178
NITROGEN	%	1.39	1.45	1.60	1.75	ASTM D3179
OXYGEN (By Difference)	%	10.4	10.9	12.0	13.2	ASTM D3176
GROSS CALORIFIC VALUE	KCal/Kg	6145	6436	7088	7747	ASTM D5865
" " "	MJ/Kg	25.730	26.947	29.677	32.434	ASTM D5865
NET CALORIFIC VALUE *	KCal/Kg	5849	-	6889	-	ASTM D5865
" " "	MJ/Kg	24.490	-	28.843	-	ASTM D5865
CSN (CRUCIBLE SWELLING NUMBER)	-	-	0.0	-	-	ASTM D 720
HARDGROVE INDEX	-	-	50	-	-	ASTM D409
EMISSION FACTOR**	MTCO2/Tjoule	94	-	-	-	-

* Net Calorific Value @ Constant Pressure

** Emission Factor as per European Paliament Directive 2003/87/EC

The analysis were performed for each characteristic according to the ASTM norms outlined in this certificate

for KNIGHT ENERGY SERVICES LTD

KNIGHT ENERGY SERVICES LTD
INTERNATIONAL INSPECTORS OF COAL AND BIOFUELS

Knight Energy Services Limited
Unit 1, Palmermount Industrial Estate, Dundonald, Ayrshire KA2 9BL, Scotland, UK
Tel: +44 (0) 1563 850375 | **Email:** ahk.scotland@ahkgroup.com | **solidfuels.ahkgroup.com**

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ALFRED H KNIGHT

CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER	:	367948/2
DATE OF ISSUE	:	14th April 2020
MATERIAL DESCRIPTION	:	Colombian Steam Coal
VESSEL	:	MV. ALGOMA VISION
LOAD PORT	:	Puerto Drummond, Colombia
DATE LOADED	:	9th - 11th April 2020
B/L WEIGHT	:	61,801.47 MT

Report of Analysis

ASH FUSION TEMPERATURES

ASH FUSION TEMPERATURES *			
PARAMETER	REDUCING	OXIDISING	TEST METHOD
IDT	1200	1320	ASTM D1857
ST	1230	1340	ASTM D1857
HT	1270	1370	ASTM D1857
FT	1280	1440	ASTM D1857

* Temperatures in Degrees Celcius

ASH ANALYSIS

OXIDE	UNITE	VALUE	TEST METHOD
SiO2	%	56.60	ASTM D4326
Al2O3	%	21.60	ASTM D4326
Fe2O3	%	9.78	ASTM D4326
TiO2	%	0.93	ASTM D4326
Mn3O4	%	0.07	ASTM D4326
CaO	%	2.96	ASTM D4326
MgO	%	1.33	ASTM D4326
Na2O	%	1.69	ASTM D4326
K2O	%	1.99	ASTM D4326
P2O5	%	0.08	ASTM D4326
SO3	%	2.97	ASTM D5016

SIZE ANALYSIS

SIZE (mm)	UNIT	FRACTION	TEST METHOD
>50.0	%	3.7	ASTM D4749
50.0 x 25.0	%	18.5	ASTM D4749
25.0 x 6.25	%	38.4	ASTM D4749
<6.25	%	39.4	ASTM D4749

Trace Metal Analysis

Element	Unit	Value	TEST METHOD
NICKEL	ppm	6.48	ASTM D 3683
VANADIUM	ppm	17.42	ASTM D 3683
MERCURY	ppm	0.06	ASTM D 3683
ARSENIC	ppm	3.55	ASTM D 3683
MANGANESE	ppm	19.2	ASTM D 3683

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ALFRED H KNIGHT

CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER	:	370940/1
DATE OF ISSUE	:	3rd August 2020
MATERIAL DESCRIPTION	:	Colombian Steam Coal
VESSEL	:	**MV. CSL TARANTAU**
LOAD PORT	:	Puerto Drummond, Colombia
DATE LOADED	:	28th - 29th July 2020
B/L WEIGHT	:	61,272.16 MT

Report of Analysis

PARAMETER	UNIT	AS RECEIVED	AIR DRIED	DRY BASIS	DRY ASH-FREE	TEST METHOD
TOTAL MOISTURE	%	15.6	-	-	-	ASTM D3302
INHERENT MOISTURE	%	-	11.8	-	-	ASTM D3173
ASH CONTENT	%	5.3	5.6	6.3	-	ASTM D3174
VOLATILE MATTER	%	35.4	37.0	41.9	44.7	ASTM D3175
FIXED CARBON	%	43.7	45.6	51.8	55.3	ASTM D3172
TOTAL SULPHUR	%	0.46	0.48	0.54	0.58	ASTM D3177
CHLORINE	%	0.01	0.01	0.01	0.01	ASTM D2361
FLUORINE	ppm	57	60	68	72.57	ASTM D3761
CARBON	%	62.4	65.2	73.9	78.9	ASTM D3178
COAL HYDROGEN	%	4.21	4.40	4.99	5.33	ASTM D3178
NITROGEN	%	1.38	1.45	1.64	1.75	ASTM D3179
OXYGEN (By Difference)	%	10.7	11.1	12.6	13.5	ASTM D3176
GROSS CALORIFIC VALUE	KCal/Kg	6096	6370	7223	7708	ASTM D5865
" " "	MJ/Kg	25.523	26.672	30.240	32.273	ASTM D5865
NET CALORIFIC VALUE *	KCal/Kg	5789	-	6967	-	ASTM D5865
" " "	MJ/Kg	24.239	-	28.822	-	ASTM D5865
CSN (CRUCIBLE SWELLING NUMBER)	-	-	0.0	-	-	ASTM D 720
HARDGROVE INDEX	-	-	51	-	-	ASTM D409
EMISSION FACTOR**	MTCO2/Tjoule	94	-	-	-	-

*** Net Calorific Value @ Constant Pressure**

**** Emission Factor as per European Paliament Directive 2003/87/EC**

The analysis were performed for each characteristic according to the ASTM norms outlined in this certificate

for KNIGHT ENERGY SERVICES LTD

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INTERNATIONAL INSPECTORS OF COAL AND BIOFUELS

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ALFRED H KNIGHT

CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER	:	370940/2
DATE OF ISSUE	:	3rd August 2020
MATERIAL DESCRIPTION	:	Colombian Steam Coal
VESSEL	:	**MV. CSL TARANTAU**
LOAD PORT	:	Puerto Drummond, Colombia
DATE LOADED	:	28th - 29th July 2020
B/L WEIGHT	:	61,272.16 MT

Report of Analysis

ASH FUSION TEMPERATURES

ASH FUSION TEMPERATURES *			
PARAMETER	REDUCING	OXIDISING	TEST METHOD
IDT	1220	1270	ASTM D1857
ST	1240	1290	ASTM D1857
HT	1280	1340	ASTM D1857
FT	1410	1410	ASTM D1857

* Temperatures in Degrees Celcius

ASH ANALYSIS

OXIDE	UNIT	VALUE	TEST METHOD
SiO2	%	54.94	ASTM D4326
Al2O3	%	21.54	ASTM D4326
Fe2O3	%	8.21	ASTM D4326
TiO2	%	1.00	ASTM D4326
Mn3O4	%	0.10	ASTM D4326
CaO	%	4.68	ASTM D4326
MgO	%	1.54	ASTM D4326
Na2O	%	2.43	ASTM D4326
K2O	%	1.62	ASTM D4326
P2O5	%	0.10	ASTM D4326
SO3	%	3.84	ASTM D5016

SIZE ANALYSIS

SIZE (mm)	UNIT	FRACTION	TEST METHOD
>50.0	%	4.1	ASTM D4749
50.0 x 25.0	%	18.8	ASTM D4749
25.0 x 6.25	%	35.0	ASTM D4749
<6.25	%	42.1	ASTM D4749

Trace Metal Analysis

Element	Unit	Value	TEST METHOD
NICKEL	ppm	6.42	ASTM D 3683
VANADIUM	ppm	16.33	ASTM D 3683
MERCURY	ppm	0.06	ASTM D 3683
ARSENIC	ppm	3.51	ASTM D 3683
MANGANESE	ppm	18.9	ASTM D 3683

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ALFRED H KNIGHT

CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER	:	370325/1
DATE OF ISSUE	:	3rd July 2020
MATERIAL DESCRIPTION	:	Colombian Steam Coal
VESSEL	:	**MV. R.T. HON PAUL E. MARTIN**
LOAD PORT	:	Puerto Drummond, Colombia
DATE LOADED	:	29th - 30th June 2020
B/L WEIGHT	:	62,578.63 MT

Report of Analysis

PARAMETER	UNIT	AS RECEIVED	AIR DRIED	DRY BASIS	DRY ASH-FREE	TEST METHOD
TOTAL MOISTURE	%	15.9	-	-	-	ASTM D3302
INHERENT MOISTURE	%	-	12.0	-	-	ASTM D3173
ASH CONTENT	%	6.5	6.8	7.7	-	ASTM D3174
VOLATILE MATTER	%	34.1	35.7	40.6	44.0	ASTM D3175
FIXED CARBON	%	43.5	45.5	51.7	56.0	ASTM D3172
TOTAL SULPHUR	%	0.61	0.64	0.73	0.79	ASTM D3177
CHLORINE	%	0.01	0.01	0.01	0.01	ASTM D2361
FLUORINE	ppm	61	63	72	78.01	ASTM D3761
CARBON	%	60.8	63.6	72.3	78.3	ASTM D3178
COAL HYDROGEN	%	4.21	4.41	5.01	5.43	ASTM D3178
NITROGEN	%	1.35	1.42	1.61	1.74	ASTM D3179
OXYGEN (By Difference)	%	10.6	11.1	12.7	13.7	ASTM D3176
GROSS CALORIFIC VALUE	KCal/Kg	5927	6202	7047	7635	ASTM D5865
" " "	MJ/Kg	24.815	25.965	29.506	31.967	ASTM D5865
NET CALORIFIC VALUE *	KCal/Kg	5618	-	6791	-	ASTM D5865
" " "	MJ/Kg	23.523	-	28.432	-	ASTM D5865
CSN (CRUCIBLE SWELLING NUMBER)	-	-	0.0	-	-	ASTM D 720
HARDGROVE INDEX	-	-	51	-	-	ASTM D409
EMISSION FACTOR**	MTCO2/Tjoule	95	-	-	-	-

*** Net Calorific Value @ Constant Pressure**

**** Emission Factor as per European Paliament Directive 2003/87/EC**

The analysis were performed for each characteristic according to the ASTM norms outlined in this certificate

for KNIGHT ENERGY SERVICES LTD

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ALFRED H KNIGHT

CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER	:	370325/2
DATE OF ISSUE	:	3rd July 2020
MATERIAL DESCRIPTION	:	Colombian Steam Coal
VESSEL	:	**M.V. R.T. HON PAUL E. MARTIN**
LOAD PORT	:	Puerto Drummond, Colombia
DATE LOADED	:	29th - 30th June 2020
B/L WEIGHT	:	62,578.63 MT

Report of Analysis

ASH FUSION TEMPERATURES

ASH FUSION TEMPERATURES *			
PARAMETER	REDUCING	OXIDISING	TEST METHOD
IDT	1170	1260	ASTM D1857
ST	1220	1290	ASTM D1857
HT	1270	1340	ASTM D1857
FT	1390	1410	ASTM D1857

* Temperatures in Degrees Celcius

ASH ANALYSIS

OXIDE	UNIT	VALUE	TEST METHOD
SiO2	%	54.30	ASTM D4326
Al2O3	%	20.46	ASTM D4326
Fe2O3	%	10.45	ASTM D4326
TiO2	%	0.95	ASTM D4326
Mn3O4	%	0.09	ASTM D4326
CaO	%	4.06	ASTM D4326
MgO	%	1.46	ASTM D4326
Na2O	%	2.34	ASTM D4326
K2O	%	1.90	ASTM D4326
P2O5	%	0.07	ASTM D4326
SO3	%	3.92	ASTM D5016

SIZE ANALYSIS

SIZE (mm)	UNIT	FRACTION	TEST METHOD
>50.0	%	3.7	ASTM D4749
50.0 x 25.0	%	19.1	ASTM D4749
25.0 x 6.25	%	37.3	ASTM D4749
<6.25	%	39.9	ASTM D4749

Trace Metal Analysis

Element	Unit	Value	TEST METHOD
NICKEL	ppm	6.41	ASTM D 3683
VANADIUM	ppm	16.98	ASTM D 3683
MERCURY	ppm	0.06	ASTM D 3683
ARSENIC	ppm	3.42	ASTM D 3683
MANGANESE	ppm	17.4	ASTM D 3683

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ALFRED H KNIGHT

CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER	:	370030/1
DATE OF ISSUE	:	12th June 2020
MATERIAL DESCRIPTION	:	Colombian Steam Coal
VESSEL	:	**MV. CSL TARANTAU**
LOAD PORT	:	Puerto Drummond, Colombia
DATE LOADED	:	6th - 7th June 2020
B/L WEIGHT	:	61,318.58 MT

Report of Analysis

PARAMETER	UNIT	AS RECEIVED	AIR DRIED	DRY BASIS	DRY ASH-FREE	TEST METHOD
TOTAL MOISTURE	%	15.4	-	-	-	ASTM D3302
INHERENT MOISTURE	%	-	11.8	-	-	ASTM D3173
ASH CONTENT	%	5.4	5.6	6.4	-	ASTM D3174
VOLATILE MATTER	%	35.0	36.5	41.4	44.2	ASTM D3175
FIXED CARBON	%	44.2	46.1	52.2	55.8	ASTM D3172
TOTAL SULPHUR	%	0.59	0.62	0.70	0.75	ASTM D3177
CHLORINE	%	0.01	0.01	0.01	0.01	ASTM D2361
FLUORINE	ppm	52	54	61	65.17	ASTM D3761
CARBON	%	62.3	64.9	73.6	78.6	ASTM D3178
COAL HYDROGEN	%	4.33	4.52	5.12	5.47	ASTM D3178
NITROGEN	%	1.37	1.43	1.62	1.73	ASTM D3179
OXYGEN (By Difference)	%	10.6	11.1	12.6	13.4	ASTM D3176
GROSS CALORIFIC VALUE	KCal/Kg	6077	6335	7183	7674	ASTM D5865
" " "	MJ/Kg	25.443	26.525	30.074	32.130	ASTM D5865
NET CALORIFIC VALUE *	KCal/Kg	5765	-	6830	-	ASTM D5865
" " "	MJ/Kg	24.138	-	28.822	-	ASTM D5865
CSN (CRUCIBLE SWELLING NUMBER)	-	-	0.0	-	-	ASTM D 720
HARDGROVE INDEX	-	-	49	-	-	ASTM D409
EMISSION FACTOR**	MTCO2/Tjoule	95	-	-	-	-

* Net Calorific Value @ Constant Pressure
** Emission Factor as per European Paliament Directive 2003/87/EC

The analysis were performed for each characteristic according to the ASTM norms outlined in this certificate

for KNIGHT ENERGY SERVICES LTD

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ALFRED H KNIGHT

CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER	:	37030/2
DATE OF ISSUE	:	12th June 2020
MATERIAL DESCRIPTION	:	Colombian Steam Coal
VESSEL	:	MV. CSL TARANTAU
LOAD PORT	:	Puerto Drummond, Colombia
DATE LOADED	:	6th - 7th June 2020
B/L WEIGHT	:	61,318.58 MT

Report of Analysis

ASH FUSION TEMPERATURES

ASH FUSION TEMPERATURES *			
PARAMETER	REDUCING	OXIDISING	TEST METHOD
IDT	1170	1240	ASTM D1857
ST	1190	1280	ASTM D1857
HT	1220	1310	ASTM D1857
FT	1360	1420	ASTM D1857

* Temperatures in Degrees Celcius

ASH ANALYSIS

OXIDE	UNIT	VALUE	TEST METHOD
SiO2	%	53.69	ASTM D4326
Al2O3	%	19.24	ASTM D4326
Fe2O3	%	10.37	ASTM D4326
TiO2	%	0.94	ASTM D4326
Mn3O4	%	0.07	ASTM D4326
CaO	%	4.40	ASTM D4326
MgO	%	1.62	ASTM D4326
Na2O	%	3.26	ASTM D4326
K2O	%	1.55	ASTM D4326
P2O5	%	0.04	ASTM D4326
SO3	%	4.82	ASTM D5016

SIZE ANALYSIS

SIZE (mm)	UNIT	FRACTION	TEST METHOD
>50.0	%	3.8	ASTM D4749
50.0 x 25.0	%	18.9	ASTM D4749
25.0 x 6.25	%	37.6	ASTM D4749
<6.25	%	39.7	ASTM D4749

Trace Metal Analysis

Element	Unit	Value	TEST METHOD
NICKEL	ppm	6.28	ASTM D 3683
VANADIUM	ppm	16.97	ASTM D 3683
MERCURY	ppm	0.06	ASTM D 3683
ARSENIC	ppm	3.36	ASTM D 3683
MANGANESE	ppm	20.2	ASTM D 3683

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ALFRED H KNIGHT

ORIGINAL

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CERTIFICATE OF ANALYSIS

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CERTIFICATE NUMBER	:	368766/1
DATE OF ISSUE	:	19th March 2020
MATERIAL DESCRIPTION	:	Colombian Steam Coal
VESSEL	:	**MV. ALGOMA VISION**
LOAD PORT	:	Puerto Drummond, Colombia
DATE LOADED	:	15th - 16th March 2020
B/L WEIGHT	:	62,078.82 MT

Report of Analysis

PARAMETER	UNIT	AS RECEIVED	AIR DRIED	DRY BASIS	DRY ASH-FREE	TEST METHOD
TOTAL MOISTURE	%	16.1	-	-	-	ASTM D3302
INHERENT MOISTURE	%	-	12.2	-	-	ASTM D3173
ASH CONTENT	%	6.5	6.8	7.7	-	ASTM D3174
VOLATILE MATTER	%	33.1	34.6	39.4	42.7	ASTM D3175
FIXED CARBON	%	44.3	46.4	52.9	57.3	ASTM D3172
TOTAL SULPHUR	%	0.63	0.66	0.75	0.81	ASTM D3177
CHLORINE	%	0.01	0.01	0.01	0.01	ASTM D2361
FLUORINE	ppm	47	49	56	60.67	ASTM D3761
CARBON	%	60.7	63.5	72.3	78.3	ASTM D3178
COAL HYDROGEN	%	4.13	4.32	4.92	5.33	ASTM D3178
NITROGEN	%	1.31	1.37	1.56	1.69	ASTM D3179
OXYGEN (By Difference)	%	10.7	11.2	12.8	13.8	ASTM D3176
GROSS CALORIFIC VALUE	KCal/Kg	5903	6178	7036	7623	ASTM D5865
" " "	MJ/Kg	24.715	25.864	29.458	31.915	ASTM D5865
NET CALORIFIC VALUE *	KCal/Kg	5598	-	6784	-	ASTM D5865
" " "	MJ/Kg	23.437	-	28.404	-	ASTM D5865
CSN (CRUCIBLE SWELLING NUMBER)	-	-	0.0	-	-	ASTM D 720
HARDGROVE INDEX	-	-	48	-	-	ASTM D409
EMISSION FACTOR**	MTCO2/Tjoule	95	-	-	-	-

*** Net Calorific Value @ Constant Pressure**

**** Emission Factor as per European Paliament Directive 2003/87/EC**

The analysis were performed for each characteristic according to the ASTM norms outlined in this certificate

KNIGHT ENERGY SERVICES LTD — INTERNATIONAL INSPECTORS OF COAL AND BIOFUELS

for KNIGHT ENERGY SERVICES LTD

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CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER	:	368766/2
DATE OF ISSUE	:	19th March 2020
MATERIAL DESCRIPTION	:	Colombian Steam Coal
VESSEL	:	**MV. ALGOMA VISION**
LOAD PORT	:	Puerto Drummond, Colombia
DATE LOADED	:	15th - 16th March 2020
B/L WEIGHT	:	62,078.82 MT

Report of Analysis

ASH FUSION TEMPERATURES

ASH FUSION TEMPERATURES *			
PARAMETER	REDUCING	OXIDISING	TEST METHOD
IDT	1180	1260	ASTM D1857
ST	1220	1280	ASTM D1857
HT	1260	1330	ASTM D1857
FT	1390	1420	ASTM D1857

*** Temperatures in Degrees Celciu**

ASH ANALYSIS

OXIDE	UNITE	VALUE	TEST METHOD
SiO2	%	54.62	ASTM D4326
Al2O3	%	19.28	ASTM D4326
Fe2O3	%	9.54	ASTM D4326
TiO2	%	0.90	ASTM D4326
Mn3O4	%	0.07	ASTM D4326
CaO	%	4.54	ASTM D4326
MgO	%	1.72	ASTM D4326
Na2O	%	2.61	ASTM D4326
K2O	%	1.70	ASTM D4326
P2O5	%	0.04	ASTM D4326
SO3	%	4.98	ASTM D5016

SIZE ANALYSIS

SIZE (mm)	UNIT	FRACTION	TEST METHOD
>50.0	%	3.8	ASTM D4749
50.0 x 25.0	%	17.7	ASTM D4749
25.0 x 6.25	%	38.7	ASTM D4749
<6.25	%	39.8	ASTM D4749

Trace Metal Analysis

Element	Unit	Value	TEST METHOD
NICKEL	ppm	6.28	ASTM D 3683
VANADIUM	ppm	15.42	ASTM D 3683
MERCURY	ppm	0.06	ASTM D 3683
ARSENIC	ppm	3.34	ASTM D 3683
MANGANESE	ppm	19.7	ASTM D 3683

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for KNIGHT ENERGY SERVICES LTD

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ALFRED H KNIGHT

CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER	:	369559/1
DATE OF ISSUE	:	18th May 2020
MATERIAL DESCRIPTION	:	Colombian Steam Coal
VESSEL	:	**M.V. CSL TARANTAU**
LOAD PORT	:	Puerto Drummond, Colombia
DATE LOADED	:	12th - 13th May 2020
B/L WEIGHT	:	62,152.11 MT

Report of Analysis

PARAMETER	UNIT	AS RECEIVED	AIR DRIED	DRY BASIS	DRY ASH-FREE	TEST METHOD
TOTAL MOISTURE	%	15.1	-	-	-	ASTM D3302
INHERENT MOISTURE	%	-	11.2	-	-	ASTM D3173
ASH CONTENT	%	6.3	6.6	7.4	-	ASTM D3174
VOLATILE MATTER	%	33.9	35.4	39.9	43.1	ASTM D3175
FIXED CARBON	%	44.7	46.8	52.7	56.9	ASTM D3172
TOTAL SULPHUR	%	0.59	0.61	0.69	0.75	ASTM D3177
CHLORINE	%	0.01	0.01	0.01	0.01	ASTM D2361
FLUORINE	ppm	53	56	63	68.03	ASTM D3761
CARBON	%	61.6	64.4	72.5	78.3	ASTM D3178
COAL HYDROGEN	%	4.10	4.29	4.83	5.22	ASTM D3178
NITROGEN	%	1.39	1.46	1.64	1.77	ASTM D3179
OXYGEN (By Difference)	%	11.0	11.5	12.9	14.0	ASTM D3176
GROSS CALORIFIC VALUE	KCal/Kg	6055	6333	7131	7701	ASTM D5865
" " "	MJ/Kg	25.349	26.514	29.858	32.244	ASTM D5865
NET CALORIFIC VALUE *	KCal/Kg	5757	-	6884	-	ASTM D5865
" " "	MJ/Kg	24.102	-	28.822	-	ASTM D5865
CSN (CRUCIBLE SWELLING NUMBER)	-	-	0.0	-	-	ASTM D 720
HARDGROVE INDEX	-	-	50	-	-	ASTM D409
EMISSION FACTOR**	MTCO2/Tjoule	94	-	-	-	-

*** Net Calorific Value @ Constant Pressure**

**** Emission Factor as per European Paliament Directive 2003/87/EC**

The analysis were performed for each characteristic according to the ASTM norms outlined in this certificate

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ALFRED H KNIGHT

CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER	:	369559/2
DATE OF ISSUE	:	18th May 2020
MATERIAL DESCRIPTION	:	Colombian Steam Coal
VESSEL	:	**M.V. CSL TARANTAU**
LOAD PORT	:	Puerto Drummond, Colombia
DATE LOADED	:	12th - 13th May 2020
B/L WEIGHT	:	62,152.11 MT

Report of Analysis

ASH FUSION TEMPERATURES

ASH FUSION TEMPERATURES *			
PARAMETER	REDUCING	OXIDISING	TEST METHOD
IDT	1190	1260	ASTM D1857
ST	1220	1320	ASTM D1857
HT	1240	1350	ASTM D1857
FT	1370	1410	ASTM D1857

* Temperatures in Degrees Celcius

ASH ANALYSIS

OXIDE	UNITE	VALUE	TEST METHOD
SiO2	%	55.39	ASTM D4326
Al2O3	%	21.42	ASTM D4326
Fe2O3	%	9.34	ASTM D4326
TiO2	%	0.97	ASTM D4326
Mn3O4	%	0.07	ASTM D4326
CaO	%	3.74	ASTM D4326
MgO	%	1.73	ASTM D4326
Na2O	%	2.10	ASTM D4326
K2O	%	1.82	ASTM D4326
P2O5	%	0.08	ASTM D4326
SO3	%	3.34	ASTM D5016

SIZE ANALYSIS

SIZE (mm)	UNIT	FRACTION	TEST METHOD
>50.0	%	3.6	ASTM D4749
50.0 x 25.0	%	17.0	ASTM D4749
25.0 x 6.25	%	39.1	ASTM D4749
<6.25	%	40.3	ASTM D4749

Trace Metal Analysis

Element	Unit	Value	TEST METHOD
NICKEL	ppm	6.19	ASTM D 3683
VANADIUM	ppm	17.09	ASTM D 3683
MERCURY	ppm	0.07	ASTM D 3683
ARSENIC	ppm	3.31	ASTM D 3683
MANGANESE	ppm	19.8	ASTM D 3683

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ALFRED H KNIGHT

CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER	:	372748/1
DATE OF ISSUE	:	15th October 2020
MATERIAL DESCRIPTION	:	Colombian Steam Coal
VESSEL	:	**MV. CSL TARANTAU**
LOAD PORT	:	Puerto Drummond, Colombia
DATE LOADED	:	8th October 2020
B/L WEIGHT	:	62,124.42 MT

Report of Analysis

PARAMETER	UNIT	AS RECEIVED	AIR DRIED	DRY BASIS	DRY ASH-FREE	TEST METHOD
TOTAL MOISTURE	%	13.2	-	-	-	ASTM D3302
INHERENT MOISTURE	%	-	10.8	-	-	ASTM D3173
ASH CONTENT	%	6.2	6.3	7.1	-	ASTM D3174
VOLATILE MATTER	%	35.5	36.5	40.9	44.0	ASTM D3175
FIXED CARBON	%	45.1	46.4	52.0	56.0	ASTM D3172
TOTAL SULPHUR	%	0.73	0.75	0.84	0.90	ASTM D3177
CHLORINE	%	0.01	0.01	0.01	0.01	ASTM D2361
FLUORINE	ppm	56	58	65	69.97	ASTM D3761
CARBON	%	63.5	65.3	73.2	78.8	ASTM D3178
COAL HYDROGEN	%	4.41	4.53	5.08	5.47	ASTM D3178
NITROGEN	%	1.41	1.45	1.62	1.74	ASTM D3179
OXYGEN (By Difference)	%	10.6	10.8	12.2	13.1	ASTM D3176
GROSS CALORIFIC VALUE	KCal/Kg	6177	6348	7117	7661	ASTM D5865
" " "	MJ/Kg	25.864	26.579	29.797	32.074	ASTM D5865
NET CALORIFIC VALUE *	KCal/Kg	5874	-	6767	-	ASTM D5865
" " "	MJ/Kg	24.595	-	28.335	-	ASTM D5865
CSN (CRUCIBLE SWELLING NUMBER)	-	-	0.0	-	-	ASTM D 720
HARDGROVE INDEX	-	-	48	-	-	ASTM D409
EMISSION FACTOR**	MTCO2/Tjoule	95	-	-	-	-

*** Net Calorific Value @ Constant Pressure**
**** Emission Factor as per European Paliament Directive 2003/87/EC**

The analysis were performed for each characteristic according to the ASTM norms outlined in this certificate

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ALFRED H KNIGHT

CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER	:	372748/2
DATE OF ISSUE	:	15th October 2020
MATERIAL DESCRIPTION	:	Colombian Steam Coal
VESSEL	:	MV. CSL TARANTAU
LOAD PORT	:	Puerto Drummond, Colombia
DATE LOADED	:	8th October 2020
B/L WEIGHT	:	62,124.42 MT

Report of Analysis

ASH FUSION TEMPERATURES

ASH FUSION TEMPERATURES *			
PARAMETER	REDUCING	OXIDISING	TEST METHOD
IDT	1180	1240	ASTM D1857
ST	1200	1280	ASTM D1857
HT	1240	1320	ASTM D1857
FT	1360	1400	ASTM D1857

* Temperatures in Degrees Celcius

ASH ANALYSIS

OXIDE	UNIT	VALUE	TEST METHOD
SiO2	%	53.05	ASTM D4326
Al2O3	%	18.40	ASTM D4326
Fe2O3	%	12.19	ASTM D4326
TiO2	%	0.82	ASTM D4326
Mn3O4	%	0.10	ASTM D4326
CaO	%	5.13	ASTM D4326
MgO	%	1.65	ASTM D4326
Na2O	%	2.07	ASTM D4326
K2O	%	1.70	ASTM D4326
P2O5	%	0.04	ASTM D4326
SO3	%	4.85	ASTM D5016

Trace Metal Analysis

Element	Unit	Value	TEST METHOD
NICKEL	ppm	6.32	ASTM D 3683
VANADIUM	ppm	16.37	ASTM D 3683
MERCURY	ppm	0.08	ASTM D 3683
ARSENIC	ppm	3.52	ASTM D 3683
MANGANESE	ppm	19.4	ASTM D 3683

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CERTIFICATE OF ANALYSIS

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CERTIFICATE NUMBER	:	371976/1
DATE OF ISSUE	:	21st September 2020
MATERIAL DESCRIPTION	:	Colombian Steam Coal
VESSEL	:	**MV. ALGOMA VISION**
LOAD PORT	:	Puerto Drummond, Colombia
DATE LOADED	:	15th - 17th September 2020
B/L WEIGHT	:	61,611.21 MT

Report of Analysis

PARAMETER	UNIT	AS RECEIVED	AIR DRIED	DRY BASIS	DRY ASH-FREE	TEST METHOD
TOTAL MOISTURE	%	16.7	-	-	-	ASTM D3302
INHERENT MOISTURE	%	-	11.7	-	-	ASTM D3173
ASH CONTENT	%	4.3	4.6	5.2	-	ASTM D3174
VOLATILE MATTER	%	33.7	35.7	40.4	42.6	ASTM D3175
FIXED CARBON	%	45.3	48.0	54.4	57.4	ASTM D3172
TOTAL SULPHUR	%	0.43	0.46	0.52	0.55	ASTM D3177
CHLORINE	%	0.01	0.01	0.01	0.01	ASTM D2361
FLUORINE	ppm	50	53	60	63.29	ASTM D3761
CARBON	%	62.4	66.1	74.9	79.0	ASTM D3178
COAL HYDROGEN	%	4.21	4.47	5.06	5.34	ASTM D3178
NITROGEN	%	1.32	1.40	1.59	1.68	ASTM D3179
OXYGEN (By Difference)	%	10.6	11.2	12.7	13.4	ASTM D3176
GROSS CALORIFIC VALUE	KCal/Kg	6047	6410	7259	7657	ASTM D5865
" " "	MJ/Kg	25.317	26.837	30.393	32.060	ASTM D5865
NET CALORIFIC VALUE *	KCal/Kg	5734	-	6889	-	ASTM D5865
" " "	MJ/Kg	24.006	-	28.843	-	ASTM D5865
CSN (CRUCIBLE SWELLING NUMBER)	-	-	0.0	-	-	ASTM D 720
HARDGROVE INDEX	-	-	51	-	-	ASTM D409
EMISSION FACTOR**	MTCO2/Tjoule	95	-	-	-	-

* Net Calorific Value @ Constant Pressure

** Emission Factor as per European Paliament Directive 2003/87/EC

The analysis were performed for each characteristic according to the ASTM norms outlined in this certificate

for KNIGHT ENERGY SERVICES LTD

KNIGHT ENERGY SERVICES LTD
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ALFRED H KNIGHT

CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER	:	371976/2
DATE OF ISSUE	:	21st September 2020
MATERIAL DESCRIPTION	:	Colombian Steam Coal
VESSEL	:	MV. ALGOMA VISION
LOAD PORT	:	Puerto Drummond, Colombia
DATE LOADED	:	15th - 17th September 2020
B/L WEIGHT	:	61,611.21 MT

Report of Analysis

ASH FUSION TEMPERATURES

ASH FUSION TEMPERATURES *			
PARAMETER	REDUCING	OXIDISING	TEST METHOD
IDT	1150	1230	ASTM D1857
ST	1180	1280	ASTM D1857
HT	1200	1310	ASTM D1857
FT	1300	1390	ASTM D1857

* Temperatures in Degrees Celcius

ASH ANALYSIS

OXIDE	UNITE	VALUE	TEST METHOD
SiO2	%	51.73	ASTM D4326
Al2O3	%	18.24	ASTM D4326
Fe2O3	%	10.06	ASTM D4326
TiO2	%	0.91	ASTM D4326
Mn3O4	%	0.10	ASTM D4326
CaO	%	5.82	ASTM D4326
MgO	%	2.03	ASTM D4326
Na2O	%	3.38	ASTM D4326
K2O	%	1.31	ASTM D4326
P2O5	%	0.04	ASTM D4326
SO3	%	6.38	ASTM D5016

SIZE ANALYSIS

SIZE (mm)	UNIT	FRACTION	TEST METHOD
>50.0	%	3.7	ASTM D4749
50.0 x 25.0	%	17.2	ASTM D4749
25.0 x 6.25	%	35.9	ASTM D4749
<6.25	%	43.2	ASTM D4749

Trace Metal Analysis

Element	Unit	Value	TEST METHOD
NICKEL	ppm	5.98	ASTM D 3683
VANADIUM	ppm	16.25	ASTM D 3683
MERCURY	ppm	0.07	ASTM D 3683
ARSENIC	ppm	3.39	ASTM D 3683
MANGANESE	ppm	20.0	ASTM D 3683

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